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Mine Permit Number 10450017 Mine Name Mercur Mine  
Operator BARRICK Resources Date 6-4-1998  
TO \_\_\_\_\_ FROM \_\_\_\_\_

☐ CONFIDENTIAL ☐ BOND CLOSURE ☐ LARGE MAPS ☒ EXPANDABLE  
☐ MULTIPUL DOCUMENT TRACKING SHEET ☐ NEW APPROVED NOI  
☐ AMENDMENT ☐ OTHER \_\_\_\_\_

Description

YEAR-Record Number

☐ NOI ☒ Incoming ☐ Outgoing ☐ Internal ☐ Superceded  
Construction Specification

☐ NOI ☐ Incoming ☐ Outgoing ☐ Internal ☐ Superceded

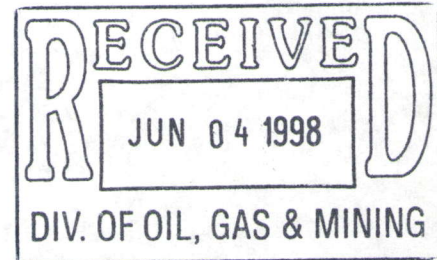
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☐ NOI ☐ Incoming ☐ Outgoing ☐ Internal ☐ Superceded

☐ TEXT/ 8 1/2 X 11 MAP PAGES ☐ 11 X 17 MAPS ☐ LARGE MAP

COMMENTS: \_\_\_\_\_

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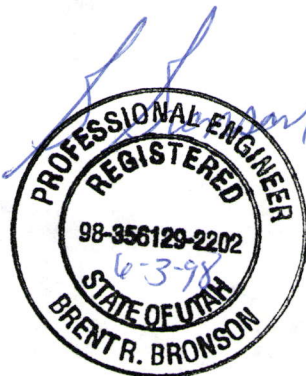


**BARRICK RESOURCES (USA) INC. - MERCUR MINE  
MERCUR CANYON  
TOOELE COUNTY, UTAH**

**IV. CONSTRUCTION SPECIFICATION**

**FOR**

**MINE SITE RECLAMATION**



**CONSTRUCTION SPECIFICATIONS  
FOR  
BARRICK RESOURCES (USA) INC. - MERCUR MINE  
MINE SITE RECLAMATION**

| <u>SECTION</u> | <u>TITLE</u>  | <u>REVISION NO.</u> | <u>DATE</u>  |
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**DIVISION 1**  
**GENERAL REQUIREMENTS**

## SECTION 01090 DEFINITIONS

### PART 1: GENERAL

#### 1.01 SUMMARY:

- A. This Section contains definitions and references applicable to the Specifications.
- B. Definitions
  - "Bidder" The party (or parties) submitting a Proposal to perform the Work.
  - "Bonds" Include Bid, performance and payment bonds and other instruments of security.
  - "Completion" Means that all Work has been fully completed, (except correction during the Period of Warranty).
  - "Contract" The contract entered into by the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative) and the **CONTRACTOR** including, without limitation, all of the documents listed under Article 2.0 hereof, and others, if any, listed in the Contract Agreement or in a subsequent Change Agreements signed by the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative) and the **CONTRACTOR**.
  - "Contract Agreement" The principal document of the Contract, signed by the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative) and the **CONTRACTOR**, that specifies the total Contract Price.
  - "Contract Amendment" (Change Order) The document signed by the **CONTRACTOR** and the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative) to amend the Contract to provide for changed or extra work and, accordingly, an increase or decrease in the Contract Price.
  - "Contract Documents" are defined as the Agreement, Addenda (which pertain to the Contract Documents), Form of Proposal which constitutes **CONTRACTOR's** Bid (including documentation accompanying the Bid and any post-Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Bonds, the General Conditions, the Contract Specifications the Construction Specifications, and the Drawings, together with all Modifications issued after the execution of the Agreement.
  - "Contract Price" The total amount of the charges for the Work ("estimated" or "fixed lump sum") stipulated in the Contract Agreement subject to such additions or deductions as may be made under the terms and conditions of the Contract.
  - "Contract Unit Prices" The fixed unit prices or rates established by the Proposal which, initially, are applied to estimated measurements of volume, time, or other units of performance to establish an estimated Contract Price, and, which ultimately, are applied to actual measurements to establish a final Contract Price.
  - "**CONTRACTOR**" is defined as the party which has executed a Contract Agreement for the specified Work with **OWNER**.

- "Drawings" is defined as the drawings in conjunction with these Specifications titled, Barrick Resources (USA) Inc. – Mercur Mine; Mine Site Reclamation, Storm Water Diversion Channels, or North Mercur Regrading Plan and Lower Access Road Design.
- "**ENGINEER**" is defined as the "Engineer of Record" and is a representative appointed and authorized by the **OWNER**. The **ENGINEER** shall be a registered Professional Engineer in the State of Utah, or a designated site representative under his supervision during construction.
- "Equal To, or Equal" Means equal in all respects to the specified product and accepted or reviewed for use in the Work by the Manager, in writing.
- "Final Acceptance" The written Final Acceptance of the Work issued by the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative) following final inspection, Mechanical Acceptance, and 100 percent completion of the Work.
- "Mechanical Acceptance" The written declaration by the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative) that any operable unit of equipment or separable portion of the Work is mechanically operative to the extent that all of the deficiencies which can be determined prior to the initiation of use have been corrected by the **CONTRACTOR**.
- "Mercur" Barrick Mercur Mine, Mercur, Utah.
- "Notice" Notices are to be defined as written notice.
- "Off-site Material" is defined as material obtained from sources other than on-site excavations or borrow areas.
- "On-site Material" is defined as borrow soils obtained from within required facility excavations and designated borrow areas;
- "**OWNER**" Barrick Resources (USA) Inc., a Delaware corporation with offices in Tooele County, Utah.
- "Products" are defined as new material, machines, components, equipment, fixtures, and systems forming the Work. This does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing material or components required for reuse.
- "Project" is defined as Barrick Resources (USA) Inc. – Mercur Mine; Mine Site Reclamation, Storm Water Diversion Channels, or North Mercur Regrading Plan and Lower Access Road Design.
- "**PROJECT MANAGER**" is defined as the designee(s) or an authorized representative of Barrick Resources (USA) Inc. ("**OWNER**") responsible for the project management. The individual designated by **OWNER** as the only person who may execute the Contract and subsequent Contract Amendments.
- "Proposal" (or "Bid") The written offer setting forth the price(s) to perform the Work, as submitted by the Bidder to the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative).
- "Quality Assurance Team" is defined as the individuals working under the direction of the **ENGINEER** to perform on site quality assurance tasks for **OWNER**.

- "Record Documents" are defined as the documents prepared and certified by a Registered Land Surveyor in Utah documenting the progress, location, type and quantity of materials placed to complete the Work.
- "Revisions" are defined as changes made to the Specifications or the Drawings that are approved by the **PROJECT MANAGER** and the **ENGINEER** in writing after the Specifications on the Drawings have been finalized.
- "Site" The lands of the **OWNER** under, in, or through which the Work is to be executed.
- "Specifications" is defined as this document of technical specifications prepared for **OWNER**.
- "Subcontractor" The party which, with approval of the **OWNER** through the **PROJECT MANAGER** (**OWNER's** Representative), has executed a subcontract with the **CONTRACTOR** for the performance of a part of the Work.
- "Substantial Completion" Means the same as and adopts the definition of "Substantial Completion" or "Substantial Performance" contained in the lien legislation in effect in the State in which the Work is to be performed, and in the event no legislative definition exists for the expression "Substantial Completion" or "Substantial Performance" in the said State, Substantial Completion means that the Work has been essentially completed, sufficient to permit beneficial use by the **OWNER** for its intended purpose, and that only items of Work which cannot be completed due to conditions outside the **CONTRACTOR's** control remain to be done.
- "Supplier" Any party, which with approval of the **PROJECT MANAGER** and **OWNER**, has executed a contract with the **CONTRACTOR** or any Subcontractor to supply materials or equipment in performance of a part of the Work and includes, but is not limited to, a material man.
- "Work" The work to be performed as specified in the Contract Agreement and referred to in the Contract Documents all inclusively as "the Work."
- All slopes are described in terms of horizontal distance to vertical distance.

C. References

References to known standard specifications, including American Society of Testing Materials (ASTM), American National Standards Institute (ANSI), and Federal Test Method Standards (FTMS), shall mean and intend latest edition of such standards/specifications adopted and published at date of receipt of bids. All materials, fabrication, erection and related work required for this project shall comply with these standards/specifications which form part of this Specification as applicable, the same as if fully set forth herein.

\*\* END OF SECTION \*\*



## **SECTION 01300 QUALITY ASSURANCE AND CONSTRUCTION DOCUMENTATION**

### **PART 1: GENERAL**

#### **1.01 SUMMARY:**

The intent of this Section is to define the requirements of the Project Construction Quality Assurance (CQA) Program and the construction documentation required by the **CONTRACTOR**. The **ENGINEER** will be responsible for all CQA and testing as documented in these Specifications, and will compile a construction certification report at the completion of the Work. **CONTRACTOR** is required to complete all Work in accordance with the Project requirements. Prior to approval of Work, the **PROJECT MANAGER** will coordinate with **ENGINEER** to ensure that the Work has been completed in accordance with the Work requirements.

#### **1.02 ASSURANCE TESTING AND FREQUENCY:**

Quality Assurance tests and frequency are discussed throughout the Specifications. The frequencies indicated are minimums only, and do not include retests of failed materials. Those quality assurance tests and testing frequencies to be conducted in the field by the **ENGINEER** or the CQA Team are included in Table 01300-1 at the end of this Section.

#### **1.03 CONSTRUCTION CERTIFICATION DOCUMENTATION:**

- A. The **PROJECT MANAGER** shall be responsible for ensuring that accurate surveys are obtained for the as-built locations and elevations, and where applicable, the type, thickness, and geometry of any and all pipes, shape of grading areas prior to material placement, thickness and elevation of subsoil and topsoil layers, ditches, geosynthetic materials, limits of revegetation, and any other aspect of the work required by the contract. The **ENGINEER** may require surveys to document critical construction components. These survey requirements will be coordinated by the **PROJECT MANAGER**, in accordance with the Contract Documents.

- B. Submittals By **OWNER** Upon Completion of Work

Within fourteen (14) calendar days after completion of the WORK, **PROJECT MANAGER** shall furnish **OWNER** and **ENGINEER** with "Record Drawings" (also referred to as "As-Built Drawings") of the Work. All surveying Record Drawings shall be signed and sealed by the Utah licensed surveyor who directed the work. The required surveying for surface topography generation shall be carried out on a 100-foot by 100-foot grid with additional survey points required to define the topographic features (i.e., toe of slope, crest of slope, breaks in grade), unless otherwise directed by **PROJECT MANAGER**. Surveying for pipe layout Record Drawings shall be at fifty (50) foot spacing, breaks in grade and tie-ins from supplementary pipes

**PROJECT MANAGER** will submit completed Record Drawings within fourteen (14) calendar days upon completion of the work in the following manner:



1. Submit one (1) reproducible copy to the **OWNER**.
  2. Submit one (1) non-reproducible copy to the **OWNER**.
  3. Submit one (1) electronic copy to the **ENGINEER** on a 3.5 inch IBM compatible diskette, in AutoCad Version 13.0 or 14.0 format.
  4. Submit one (1) reproducible copy to the **ENGINEER**.
  5. Submit one (1) non-reproducible copy to the **ENGINEER**.
- D. The **CONTRACTOR** will be responsible for performing the following survey activities associated with the Construction Certification Report:
1. Provide northing, easting, and elevation reference that can be used for estimating locations of field testing and sampling location identification during Quality Assurance testing.
  2. Provide depth verification for Subsoil on a minimum frequency of one (1) per acre and provide depth verification for Topsoil on a minimum frequency of one (1) per ten thousand (10,000) square feet.

Northings, eastings, and elevations for Items 1 and 2 will be performed on an as-needed basis and results will be provided to the **PROJECT MANAGER** within 24 hours of performing the survey.

**TABLE 01300-1**  
**QUALITY ASSURANCE TABLE**

| Item   | Test Method   | Minimum Testing Frequency <sup>1</sup>                             | Survey <sup>2</sup>  |
|--|---|--|--|
| <b>1.0 Earthworks</b>                          |   |  |  |
| 1.1 Excavation                                 | Observation of excavation conditions and grade stakes | Per excavation   | May require surveying depending on the purpose of the excavation.                                    |
| 1.2 Regrading or Reshaping                     | Observation   | Observation  | Grade staking required<br>As Built when complete or prior to cover-up with subsequent layer of fill. |
| 1.3 Structural Fill and Select Structural Fill | Observation   | As-Needed  | Grade staking required for fill slopes   |
|  | Nuclear Density<br>ASTM D-2922<br>ASTM D-3017         | 1/2,000 cubic yards  | Grade staking during filling<br>As Built when complete   |
|  | Compaction<br>ASTM D-698 (95% of Maximum Dry Density) | 1/20,000 compacted cubic yards with minimum of 1 per material type |  |
|  | Moisture Content<br>ASTM D-2216                       | 1/10,000 cubic yards   |  |
| 1.4 Subsoil                                    | Observation   | All shifts   | Lines and grades of the bottom and top of subgrade (i.e., thickness of layer)                        |
|  | Thickness-<br>Backhoe excavations                     | One per Acre   |  |
| 1.5 Topsoil                                    | Observation   | All shifts   | Lines and grades of the bottom and top of layer (i.e., thickness of layer)                           |
|  | Thickness-<br>Backhoe excavations                     | 10,000 ft <sup>2</sup>   |  |

**Notes:** <sup>1</sup> The results of all CQA observations and testing (field and laboratory) will be presented in a certification report.

<sup>2</sup> Record ("As-built") drawings will be prepared and submitted in a certification report.

<sup>3</sup> Fill materials with a high percentage of particles in excess of three quarters (3/4) inch nominal size, which in the opinion of the **ENGINEER** are not practical to be tested for moisture density control with ASTM D698 procedures, shall be placed and compacted according to a method specification to be determined and approved by the **ENGINEER**.

\*\* END OF SECTION \*\*

**SECTION 01500 MOBILIZATION**

**PART 1: GENERAL**

**1.01 SUMMARY:**

- A. Mobilization shall consist of the complete preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of offices, buildings and other facilities necessary to complete the Work; and for other work and operations **CONTRACTOR** must perform or costs **CONTRACTOR** must incur before beginning work on the project, which is not covered in other bid items. Demobilization of personnel, equipment, supplies and incidentals from the site at the conclusion of construction activities are considered incidental to Mobilization and no separate payment will be made for demobilization.
- B. Measurement and Payment
  - 1. Payment for the performance of the mobilization work as above specified will be made at the contract lump sum price for the item "Mobilization"
  - 2. The partial payment amounts to be allowed for "Mobilization" under the contract will be as follows:
    - a. For each one (1) percent of total original contract amount earned from other bid items, ten (10) percent of the amount bid for mobilization, less normal retainage will be paid.
  - 3. The above schedule of partial payments for mobilization shall not be construed to limit or preclude partial payments otherwise provided by the agreement.

**\*\* END OF SECTION \*\***

**SECTION 01600 CONTRACT CLOSEOUT**

**PART 1: GENERAL**

**1.01 DESCRIPTION:**

**PROJECT MANAGER** shall prepare punch list when notified by **CONTRACTOR** that work is completed. **PROJECT MANAGER** and **ENGINEER** will conduct one final inspection only. (Note: Failure of **PROJECT MANAGER** to include any items on punch list does not alter responsibility of **CONTRACTOR** to complete the Work in accord with Contract Documents.) Deliver all items called for herein and under various **SPECIFICATION** sections, and other Contract Documents requirements, to **OWNER** at completion of work.

**\*\* END OF SECTION \*\***

**DIVISION 2**  
**MINE SITE RECLAMATION**

## **SECTION 02100 SITE PREPARATION**

### **PART 1: GENERAL**

#### **1.01 SUMMARY:**

- A. This Work includes all the site preparation activities including: clearing and grubbing, Topsoil stockpiling, and installation of temporary surface water and erosion controls. This Work is to be performed for the purpose of preparing the site for all earthwork related activities associated with the Mine Reclamation Project specifically regrading, soil placement, erosion control, and permanent surface water channel construction activities.
- B. Refer to the following Sections for related work:
  - Section 01300 - Quality Assurance and Construction Documentation
  - Section 02200 - Earthworks
  - Section 02270 - Geotextile

#### **1.02 QUALITY ASSURANCE:**

- A. **ENGINEER** shall at all times have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining that the materials and workmanship are in accordance with the Drawings and these Specifications.
- B. All site preparation operations shall be carried out under the observation of **ENGINEER** or **PROJECT MANAGER**. Testing shall be performed by **ENGINEER** in accordance with Section 01300 - Quality Assurance and Construction Documentation.
- B. Any work found unsatisfactory or any work disturbed by subsequent operations before acceptance is granted shall be corrected by **CONTRACTOR** as directed by **PROJECT MANAGER**.

#### **1.03 MEASUREMENT AND PAYMENT**

- A. Measurement and payment shall be, unless defined otherwise in the Contract Documents:
  - 1. Clearing and Grubbing shall be considered incidental for all in-scope Work;
  - 2. Per net volume (yd<sup>3</sup>) of Topsoil stripped and acceptably stockpiled.

## **PART 2: EXECUTION**

### **2.01 CLEARING AND GRUBBING:**

- A. Clearing and grubbing shall be done in designated areas within the footprint of the surface water diversions or other components of the Work where virgin ground will be impacted as delineated on the Drawings. Clearing and grubbing shall extend a maximum of fifteen (15) feet and a minimum of five (5) feet outside of the construction limits. Areas for clearing and grubbing shall be released to the **CONTRACTOR** by the **PROJECT MANAGER**. No pioneering of roads across undisturbed areas shall be allowed without prior written approval of the **PROJECT MANAGER**.

No clearing and grubbing shall be performed until written permission is given by the **PROJECT MANAGER**. Clearing and grubbing shall consist of cutting trees and brush to the ground level, removing such material, along with wood, rubbish, and any other vegetation, and disposing of all such material in the accepted manner described below.

- B. The **CONTRACTOR** shall clear all vegetative matter, rubbish, roots in excess of one (1) inch diameter, and other deleterious materials from the delineated areas.

Cleared and grubbed vegetation shall be removed and disposed of in stockpiles, by controlled burning, or wasted by way of other approved methods in an area designated by the **PROJECT MANAGER** in accordance with permits obtained from the appropriate local, State, and Federal regulatory agencies.

### **2.02 TOPSOIL:**

- A. Stripping of the salvageable Topsoil shall be done where Topsoil is present within the entire area of the stripping limits as designated on the Drawings, as determined by **PROJECT MANAGER**.

Topsoil shall be excavated and removed in a manner which will minimize contamination with other soil horizons.

Such measures as are necessary shall be taken to insure that the removal of Topsoil does not result in erosion or excessive sedimentation.

- B. In areas designated to be stripped of unsuitable or objectionable material, said materials shall be stripped to the full depth of organic soil as determined by **ENGINEER** and **PROJECT MANAGER**.
- C. Removed Topsoil shall be stockpiled at locations designated by the **PROJECT MANAGER** or placed directly on components of the Work requiring replacement of Topsoil as directed by the **PROJECT MANAGER**. Stored Topsoil shall not be disturbed by construction activities, and shall be protected from wind and water erosion, unnecessary compaction, and contamination which would lessen the capability of the material to support vegetation when redistributed. Topsoil stockpiles will be graded to minimize erosion and prevent ponding of precipitation in the stockpile areas. Stockpiled Topsoil shall be protected by an effective cover of non-noxious, quick-



growing, annual and perennial plants, seeded or planted during the first appropriate growing season after removal.

## 2.03 TEMPORARY EROSION AND SURFACE WATER CONTROLS:

- A. The **CONTRACTOR** shall be responsible for providing temporary erosion and surface water controls during construction and shall be responsible for, and shall repair at his own expense, any damage to the foundation, structures or other parts of the WORK caused by stormwater runoff, or failure of any temporary erosion or surface water controls.
- B. The **CONTRACTOR** shall be responsible for providing temporary surface water controls during construction. All temporary surface water controls not part of the permanent facility shall be removed, leveled and graded. Disturbance of areas beyond the clearing limits shall not be undertaken without prior written approval by **PROJECT MANAGER**.
- C. The **CONTRACTOR** shall have full responsibility for the adequacy of the temporary erosion and surface water controls. The sizing for temporary erosion and surface water controls should consider the duration of the construction activities, the time of the year of construction, characteristics of the storms during the construction seasons, cost of possible damage, cost of delay to the construction completion of the Work, and the safety of workmen. Historic rainfall data for the Barrick Mercur site and synthetic storm hydrographs for various return periods will be made available to **CONTRACTOR** by **PROJECT MANAGER**, upon request. **ENGINEER, OWNER and PROJECT MANAGER** assumes no responsibility for any interpretations or conclusions made by the **CONTRACTOR** from the supplied data.
- D. The **CONTRACTOR** shall dewater any stormwater from the construction area during the time required to complete construction. Acceptable dewatering measures include, but are not limited to the pumping and removal of collected water from low areas within the construction area. The method of dewatering, which is not limited to the measures listed above, shall be subject to approval by **PROJECT MANAGER**.
- E. The **CONTRACTOR** shall have full responsibility for the adequacy of the temporary erosion controls. The temporary erosion controls will conform to Best Management Practices as illustrated on the Drawings. **ENGINEER and CONSTRUCTION MANAGER** shall approve use of Best Management Practices proposed by **CONTRACTOR** prior to implementation.

\*\* END OF SECTION \*\*

## SECTION 02200 EARTHWORKS

### PART 1: GENERAL

#### 1.01 SUMMARY:

- A. This Work includes all the earthwork activities required to construct the permanent surface water channels; reclaim the heap leach pad and waste rock stockpiles; and to relocate the access road. This work includes, but is not limited to; excavation and placement of soil and rock materials for the surface water channels, North Mercur, miscellaneous regrading areas, and Valley Fill Leach #3; manufacture, load, haulage, and placement of Riprap materials for the surface water channels; excavation, haulage, and placement of Subsoil materials for the soil cover; and, excavation, haulage, and placement of Topsoil materials for the soil cover and miscellaneous regrading areas.
- B. Refer to the following Sections for related work:
  - Section 01300 - Quality Assurance and Construction Documentation
  - Section 02100 - Site Preparation
  - Section 02270 - Geotextile
  - Section 02710 - Piping

#### 1.02 QUALITY ASSURANCE:

- A. **ENGINEER** shall at all times have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining that the materials and workmanship are in accordance with the Drawings and these Specifications.
- B. All excavation, backfill, and grading operations shall be carried out under the observation of **ENGINEER** and **PROJECT MANAGER**. Testing shall be performed by **ENGINEER** in accordance with Section 01300 - Quality Assurance and Construction Documentation.
- B. Any work found unsatisfactory or any work disturbed by subsequent operations before acceptance is granted, shall be corrected by **CONTRACTOR** as directed by **PROJECT MANAGER**.

#### 1.03 MEASUREMENT AND PAYMENT

- A. Measurement and payment shall be made for:
  - 1. Per unit (lump sum – each facility) of waste rock stockpiles regraded to the lines and grades shown on the Drawings.
  - 2. Per unit (lump sum – each facility) of spent and detoxified leach ore regraded to the lines and grades shown on the Drawings.
  - 3. Per unit (lump sum – each facility) of Subsoil (loaded, hauled, and placed) to

the lines and grades shown on the Drawings.

4. Per unit (lump sum – each stockpile facility and as designated by **OWNER** for all other work components) of Topsoil (loaded, hauled, and placed) to the lines and grades shown on the Drawings.
  5. Per unit linear foot of channel type, including Riprap (manufactured, loaded, hauled, and placed) to the lines and grades shown on the Drawings, unless designated otherwise by Contract Documents. Riprap will be considered incidental to associated channel type and will not be considered a separate pay item unless designated otherwise by Contract Documents.
  6. Per cubic yard of Structural Fill (load, haul, and place) to the lines and grades shown on the Drawings. Billable Quantities will be based on neat line in-place fill as determined by third-party survey.
  7. Per cubic yard of Common Fill (placed) unless designated otherwise by contract documents.
- B. No separate measurement or payment shall be made for temporary stockpiles, unless otherwise approved by the **CONSTRUCTION MANAGER**.

## **PART 2: PRODUCTS**

### **2.01 FILL MATERIALS:**

- A. Fill materials will be soils, gravels or rock fills approved by **PROJECT MANAGER and ENGINEER**. The materials shall be free of organic matter, debris, frozen material, and other deleterious materials, and shall consist as follows:
1. Subsoil: Subsoil shall consist of clean soil and waste rock materials excavated from the Meadows Canyon Waste Rock Stockpile area or other designated areas as approved by the **PROJECT MANAGER and ENGINEER**. The subsoil in the Meadows Canyon Waste Rock Stockpile or other designated areas shall be excavated to the lines and grades illustrated on the Drawings. The maximum particle size allowed for Subsoil fill shall be sixteen (16) inches at Valley Fill #3 as measured in the smallest two adjacent and perpendicular dimensions. For all other areas of Subsoil fill placement, the maximum particle size shall be sixty-seven (67) percent of the allowable lift height as approved by **ENGINEER**.
  2. Topsoil: Topsoil shall consist of organic soil materials excavated from undisturbed ground or designated stockpiles as approved by the **PROJECT MANAGER and ENGINEER**.
  3. Riprap: Riprap shall consist of hard, dense, durable stone, angular to subrounded in shape and resistant to weathering. The stone shall have a specific gravity of at least 2.5. Riprap shall have a particle size gradation that conforms to the Riprap schedule shown on the Drawings. Riprap to be developed from the Rock Excavations and/or the processing of Waste Rock as approved by the **PROJECT MANAGER and ENGINEER**.

Material used for Riprap may be approved by visual inspection by **PROJECT MANAGER and ENGINEER**. The rock materials used to manufacture Riprap must be sound and durable.

4. Structural Fill: Structural Fill shall consist of soil and rock materials used for diversions, subgrade fill used to bring the diversions and road relocation to design grade, and other areas as designated on the Drawings. The suitability of Structural Fill material will require evaluation by **ENGINEER** and approval by **PROJECT MANAGER and ENGINEER**. Structural Fill will have a maximum particle size of sixty-seven (67) percent of the Lift Height. Any materials greater than the allowable size will be broken down or removed.
5. Select Structural Fill: Select Structural Fill shall consist of on-site or off-site soil and rock materials as designated on the Drawings for use as pipe backfill. The suitability of Structural Fill material will require evaluation by **ENGINEER** and approval by **PROJECT MANAGER and ENGINEER**. Select Structural Fill shall be well graded, clean, and free of vegetative matter conforming to the following gradation requirement:

| <u>Sieve Size</u> | <u>Percent Passing</u> |
|-------------------|------------------------|
| 1.5"              | 98 - 100               |
| 1/4"              | 0 - 15                 |
| #200              | 0 - 2                  |

The plasticity index for Select Structural Fill shall not exceed five (5).

The sum of the plasticity index and percent passing the #200 sieve shall be a minimum of five (5).

6. Common Fill: Common Fill shall consist of on-site soil, and rock materials as designated on the Drawings. Soil and rock materials used to regrade waste rock stockpiles, leach facilities, and mine pits shall be classified as Common Fill.

## 2.02 EXCAVATED MATERIALS:

- A. Common Excavation: This classification includes all material other than rock excavation.
- B. Rock Excavation: This classification includes all solid rock which cannot be removed until loosened by blasting, boring, or wedging. It is further defined as rock of such hardness and texture that it cannot be loosened or broken down by a single shank ripper mounted on a D-8 Caterpillar Bulldozer (or equivalent) in good operating condition handled by an experienced operator. In areas where it is impractical to classify material by use of the ripper described, rock excavation is defined as sound material of such hardness and texture that it cannot be excavated with a Caterpillar 235 Backhoe (or equivalent) in good operating condition handled by an experienced operator. It also includes boulders and detached pieces of solid rock greater than one (1) cubic yard in volume.

- C. Excavated bedrock materials shall be classified in accordance with Article 2.01 of this Section.

### **PART 3: EXECUTION**

#### **3.01 BORROW AREAS:**

- A. Excavation of materials from the various borrow areas shall be performed in such a way as to minimize the disturbance to surrounding areas. Material removed from the borrow areas shall be taken directly to the fill areas or, if required, stockpiled. Any stockpiles, if required, shall be located at sites approved by the **PROJECT MANAGER**.
- B. Borrow area excavations shall be graded and properly maintained to provide adequate drainage at all times. Work shall be suspended by the **CONTRACTOR** when, in the opinion of the **PROJECT MANAGER**, the site is overly wet, muddy, or otherwise unsuitable for proper maintenance, until directed otherwise by the **PROJECT MANAGER**.
- C. At the conclusion of the Work, all borrow area excavations shall be left with smooth neat lines and grades suitable for reclamation, with grades that are in general conformance with the Drawings.

#### **3.02 SUBGRADE:**

- A. The Structural Fill materials shall be placed on bedrock or suitable subgrade which has been prepared by the **CONTRACTOR** and approved by the **ENGINEER**. Alluvial soils located within the limits of the finished lines and grades or to receive the placement of Structural Fill will be scarified to a depth of one (1) foot. The subgrade will be moisture conditioned and compacted to a minimum of ninety-five (95) percent of the maximum dry density, as determined by the standard Proctor test (ASTM D698). The **ENGINEER** will inspect and approve the exposed subgrade prior to any fill being placed. In rock areas, the **CONTRACTOR** shall prepare the subgrade by removing loose rock fragments until competent foundation material is encountered, as approved by **PROJECT MANAGER**, after inspection by **ENGINEER**.
- B. The subgrade shall not contain saturated or other deleterious materials as determined by the **PROJECT MANAGER** or **ENGINEER**.
- C. The **CONTRACTOR** shall protect prepared subgrades from disturbance due to weather, construction equipment, or other factors. Subgrade surfaces, including previously approved subgrade, which become softened or otherwise unsuitable, shall be repaired to the satisfaction of the **PROJECT MANAGER** and **ENGINEER**. Subgrades found to exhibit swelling, heaving or other similar conditions shall be replaced or reworked by the **CONTRACTOR** to remove such defects.

#### **3.03 FILL PLACEMENT:**

- A. Fill placement activities shall be performed to achieve the lines and grades as shown

on the Drawings, to tolerance of plus or minus two tenths ( $\pm 0.2$ ) feet or to approved field-fit modifications made thereto, unless specified otherwise. The following general guidelines shall be followed except as noted elsewhere in this Section.

1. No Structural Fill materials shall be placed until the site preparation activities have been completed as specified in Section 02100, and subgrade preparation activities have been completed as specified herein Article 3.02 of this Section. The procedures for fill placement shall be reviewed by **ENGINEER** and approved by **PROJECT MANAGER** prior to start of fill placement.
2. No brush, roots, sod, or other deleterious or unsuitable materials shall be incorporated in the fills. The suitability of all materials intended for use in the fill shall be subject to approval by **PROJECT MANAGER** and **ENGINEER**. **CONTRACTOR** shall temporarily stop fill placement due to weather conditions, if materials and installation do not meet these Specifications.
3. For those materials with moisture conditioning requirements, the surface of the prepared foundation or the surface of any layer of the fill is too dry or too smooth to bond properly with the layer of material to be placed thereon, it shall be moisture-conditioned and/or worked with harrow, scarifier, disc, or other suitable equipment to provide a satisfactory bonding surface before fill material is placed thereon. If the surface of the prepared foundation or the rolled surface of any layer is excessively wet for fill materials to be placed thereon, it shall be removed and allowed to dry or worked with a harrow, scarifier, disc, or other suitable equipment to reduce the moisture content to an acceptable level, as determined by **PROJECT MANAGER**. It shall then be compacted before the next layer of fill material is placed. Determination of such dry or wet conditions shall be made by the **PROJECT MANAGER** and **ENGINEER**.
4. The distribution of Structural Fill materials shall be such that the fill is free from excessive voids, lenses, pockets, or layers of material differing substantially in texture or gradation from the surrounding material. The material of a fill shall be as described in Article 2.01 of this Section.
5. At all times during construction, the surface of the fill shall be graded and maintained by the **CONTRACTOR** to prevent ponding of water and for storm water drainage.
6. Except as otherwise specified or approved by **ENGINEER** and **PROJECT MANAGER**, the **CONTRACTOR** shall dump and spread fill in such a manner so that no excessive gaps are left between successively-dumped loads of materials. The fill shall be leveled prior to compaction by means of a dozer or grader, or other suitable approved equipment, to obtain a surface free from depressions.
7. **CONTRACTOR** shall apply water required for moisture conditioning on the fill or in the borrow areas, for those fill materials with moisture conditioning requirements.

**CONTRACTOR** shall maintain fill materials to be placed as Structural Fill and Select Structural Fill within the moisture content range required to permit proper compaction to the specified density with the equipment being used.

The moisture content of the fill materials, prior to and during compaction, shall be uniform throughout each layer of the material.

Prior to mixing of wet and dry material on the fill to obtain the proper moisture content, approval shall be obtained from **ENGINEER**. Placing mixed material on the fill can only be done after the material has been mixed so that a uniform distribution of the moisture content has been achieved.

**B. Common Fill**

1. Cut and fill activities shall be performed to achieve the general lines, grades, and design requirements as shown on the Drawings, or to approved field fit modifications made thereto. Tolerances are as follows:
  - a. The final grade surface in the general regrading areas shall generally match the proposed topographic contours as shown on the drawings to within a tolerance of plus or minus one ( $\pm 1$ ) foot, unless approved otherwise by **PROJECT MANAGER**.
  - b. The final grade surface in areas designated as Compacted Common Fill shall match the proposed topographic contours to within plus or minus four tenths ( $\pm 0.4$ ) foot.
2. No Common Fill materials shall be placed until the areas have been approved for fill placement by the **PROJECT MANAGER** and **ENGINEER**. The procedures for fill placement shall be approved by the **PROJECT MANAGER** and **ENGINEER** prior to start of fill placement.
3. Except in areas approved by the **ENGINEER** and **PROJECT MANAGER** where space is limited, or otherwise specified, all fill placement shall occur by routing the hauling units and the spreading units approximately parallel to the axis of the fill. Hauling units shall be so routed that they do not follow in the same paths, but split their tracks evenly across the surface of the fill with a one-half ( $1/2$ ) tire width overlap to enhance compaction.
4. Areas designated as Compacted Common Fill will be compacted using a method specification as approved by **ENGINEER**.

**C. Riprap**

1. The Riprap shall be placed in accordance with Drawings using a method specification as approved by the **ENGINEER**. Stones with typical stone dimensions meeting the minimum  $D_{50}$  and maximum  $D_{90}$  requirements shall be placed at the top surface with faces and shapes matched to minimize voids and form as smooth a surface as practical. The material may be machine-placed to form a substantial bond as approved by the **ENGINEER**.

**D. Structural Fill**

1. Structural Fill will be placed to the lines and grades as shown on the Drawings, to a tolerance of plus or minus two-tenths ( $\pm 0.2$ ) foot, unless field-fit modifications are approved otherwise by the **ENGINEER**. Unless noted otherwise, Structural Fill will be compacted to a minimum of ninety-five (95) percent of the maximum dry density, as determined by the



standard Proctor test (ASTM D698), at a moisture content of minus four (4) to plus three (3) percent of the optimum moisture content.

E. Select Structural Fill

1. Select Structural Fill will be placed to the lines and grades as shown on the Drawings, to a tolerance of plus or minus two-tenths ( $\pm 0.2$ ) foot, unless approved otherwise by the **ENGINEER**. Unless noted otherwise, Select Structural Fill will be moisture conditioned and compacted in accordance with a method specification as approved by, and in the observation of, the **ENGINEER**.

F. Subsoil

1. Placement of Subsoil activities shall be performed to achieve the lines, grades, and design requirements as shown on the Drawings or to approved field-fit modifications made thereto. Tolerances are as follows:
  - a. Subsoil shall be placed to a minimum thickness of three (3) feet and a maximum thickness of three and five-tenths (3.5) feet above the Regraded surface of VFL#3. Any filling beyond these limits shall be at the expense of the **CONTRACTOR**, unless approved otherwise by the **PROJECT MANAGER**.
2. No Subsoil materials shall be placed until the areas have been approved for fill placement by the **PROJECT MANAGER** and **ENGINEER**. The procedures for fill placement shall be evaluated and approved by the **PROJECT MANAGER** and **ENGINEER** prior to start of fill placement.
3. Except in areas otherwise approved by the **PROJECT MANAGER** and **ENGINEER**, where fill placement occurs on slopes steeper than 5(H):1(V) or where space is limited, all fill placement shall occur by routing the hauling units and the spreading units approximately parallel to the axis of the fill. Hauling units shall be so routed that they do not follow in the same paths, but split their tracks evenly across the surface of the fill with a one-half (1/2) tire width overlap to enhance compaction.

G. Topsoil

1. Topsoil placement activities shall be performed to achieve the lines, grades, and design requirements as shown on the Drawings. Tolerances are as follows:
  - a. Topsoil shall be placed to a nominal thickness of twelve (12) inches, a maximum thickness of fourteen (14) inches, and a minimum thickness of ten (10) inches above the Regraded surface or the Subsoil surface as specified on the Drawings.
  - b. Topsoil thickness not within acceptable tolerance as determined by the **ENGINEER** and **PROJECT MANAGER** will be corrected by and at the expense of the **CONTRACTOR**, unless approved otherwise by the **PROJECT MANAGER**.

2. No Topsoil materials shall be placed until the areas have been approved for fill placement by the **PROJECT MANAGER**.
3. Topsoil shall be placed in one lift in such a manner to minimize compaction. The procedures for fill placement shall be evaluated and approved by the **ENGINEER** and **PROJECT MANAGER** prior to start of fill placement.

### 3.04 EXCAVATIONS:

- A. Unless specifically noted otherwise, all excavations shall be performed to the lines and grades shown on the Drawings, or to approved field fit modifications made thereto, as approved by the **ENGINEER** and **PROJECT MANAGER**. Any excavation beyond these limits shall be at the expense of the **CONTRACTOR**, unless approved otherwise by the **PROJECT MANAGER**. No excavation or stripping shall begin until the Surveyor has provided construction staking for the proposed work. The exposed subgrade shall be inspected and approved by the **ENGINEER** and **PROJECT MANAGER** prior to any fill placed. Final surface shall be free of loose materials, clods, and other debris including grade stakes and hubs.
- B. Excavations shall be graded and properly maintained to provide adequate drainage at all times. Work shall be suspended by **CONTRACTOR** when, in the opinion of **PROJECT MANAGER**, the site is overly wet, muddy, or otherwise unsuitable for proper maintenance.
- C. Blasting if required for Rock Excavation shall be conducted only by trained and experienced personnel who hold blasting certificates for the Work.
- D. All necessary precautions shall be taken to preserve the material below and beyond the lines of excavation in the soundest possible condition. Where required to complete the Work, all excess excavation or overexcavation shall be refilled with approved materials, placed and compacted to the satisfaction of the **PROJECT MANAGER**.
- E. Safe temporary construction slopes are the responsibility of the **CONTRACTOR**.
- F. The **CONTRACTOR** shall inspect all temporary and permanent open-cut excavations on a regular basis for signs of instability. Should signs of instability be noted, the **CONTRACTOR** shall undertake remedial measures immediately and shall notify the **PROJECT MANAGER** as soon as possible.
- G. It will be the **CONTRACTOR's** responsibility to remove all loose materials from the excavated slopes and to maintain the slopes in a safe and stable condition at all times during the progress of the Work.
- H. Before undertaking Rock Excavation, the **CONTRACTOR** will submit the proposed method of excavation to the **ENGINEER** and **PROJECT MANAGER** for review and approval. The **CONTRACTOR** will have the responsibility to ensure the method conforms to all applicable laws and regulations and conforms to proven safe practices for the type of rock, proximity to structures and other installations, prevents the opening of seams and otherwise provides for minimal disturbance or the breaking the rock beyond the required lines, levels and grades, and keeps the danger and danger area to the minimum practical. Use line drilling and pre-splitting, or pre-shearing in

conjunction with cushion blasting or other approved method for final rock slopes. Use approved blasting mats as necessary to restrain the movement of material. Provide all flagman, signs, sirens, and other means necessary for safe use of explosives. Before each blast, clear all personnel, vehicles etc. from the blast area to safe limits and then ensure no personnel, vehicles etc. enter the area until after completion of the blast. Scale the sides of rock cuts as soon as possible, preferably as the sides become exposed.

- I. Construct Diversion Channels with uniform gradients between approved control points for the approved channel alignment, without excessive sags and without humps, unless specifically approved otherwise by the **ENGINEER**. Cross sectional flow areas for the Diversion Channels shown on the Drawings are the minimum allowable sections. Channel cross sections are not to be achieved through the construction of levees unless shown as such on the Drawings or approved by the **ENGINEER**. The diversion channel alignments may require field adjustment to maintain the channel tolerances as defined in this section and on the Drawings. Tolerances of approved diversion alignments, unless approved otherwise by the **ENGINEER**, will be as follows:
  1. For channel sections which will be excavated in fill materials, the tolerance of the constructed alignments shall be within minus one-half ( $1/2$ ) to plus one (1) percent of the design grades as shown on the Drawings, with a minimum allowable gradient of one-quarter (0.25) percent between fifty (50) foot stations.
  2. For channel sections which will be excavated in native material the tolerance of the constructed alignments shall be within minus one-half ( $1/2$ ) to plus one (1) percent of the design grades as shown on the Drawings, with a minimum allowable gradient of one-quarter (0.25) percent between fifty (50) foot stations.

**\*\* END OF SECTION \*\***

## **SECTION 02270 GEOTEXTILE**

### **PART 1: GENERAL**

#### **1.01 SUMMARY:**

- A. This work describes the geotextile materials required for the general separation/filtration applications as specified on the Drawings. For small local areas where geotextile is required, e.g. culverts, local stockpiled supplies of geotextile may be acceptable if approved by **ENGINEER**.
- B. Refer to the following Sections for related work:  
  
Section 02200 - Earthworks

#### **1.02 SUBMITTALS:**

- A. Earthworks **CONTRACTOR** shall provide the following information after contract award but within ten (10) days prior to material arrival on-site and prior to commencement of the work, unless designated otherwise by Contract Documents:
  - 1. The geotextile Manufacturer shall provide written certification that the geotextile to be used meets the requirements of this Project and has been continuously inspected for the presence of needles and geotextile was found to be needle free.
  - 2. A copy of the geotextile Manufacturer's Quality Control test results of properties outlined in Part 2 of this Section. The **PROJECT MANAGER** reserves the right to refuse use of any geotextile supplied without the proper Quality Control documentation.
  - 3. A detailed list of performance criteria for the geosynthetic material being produced for this project. (Note: Performance criteria are sometimes referred to as "minimum property values". Refer to Part 2 of this Section for geotextile properties and test methods.)

#### **1.03 MEASUREMENT AND PAYMENT**

- A. Use of Geotextile is considered incidental to associated channel type and will not be considered a separate pay item.

#### **1.04 QUALITY CONTROL:**

- A. All Work shall be constructed, monitored, and tested in compliance with the project requirements. The **CONTRACTOR** and geotextile Manufacturer shall participate and comply with all items in these Specifications.
- B. **CONTRACTOR** shall ensure that geotextile Manufacturer has an internal product

quality control program that meets Contract requirements.

- C. **CONTRACTOR** shall assure that the geotextile is delivered to the site at least fourteen (14) calendar days prior to installation to allow sufficient time for conformance testing, if necessary.
- D. Geotextile rolls that do not meet the requirements of this Specification will be rejected by **ENGINEER**. **CONTRACTOR** will be required to replace the rejected material with new material that complies to the Specifications, at no additional cost.
- E. In order to prevent weather damaged geotextile from being placed, the following Quality Assurance procedures shall be followed:
  - 1. **CONTRACTOR** shall perform its Work and utilize sufficient ballast as necessary to prevent wind uplift of the geotextile panels.
  - 2. If weather damage should occur, **ENGINEER** shall determine if the geotextile shall be repaired or replaced. Weather damage to the geotextile will include tears and torn fabric, as determined by the **ENGINEER**.
  - 3. Repair or replacement of the weather-damaged geotextile shall be completed by **CONTRACTOR** at no additional cost.
  - 4. As determined by **ENGINEER**, the damaged geotextile panel may be rejected at no additional cost.

#### 1.05 TRANSPORTATION, HANDLING, AND STORAGE

- A. Packing and Shipping
  - 1. Geotextile shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers, with straps for unloading.
  - 2. Geotextile rolls shall be marked or tagged with the following information.
    - a. Manufacturer's name
    - b. Product information
    - c. Roll number
    - d. Batch or lot number
    - e. Roll dimensions
  - 3. **CONTRACTOR** shall ensure that geotextile rolls are properly loaded and secured to prevent damage during transit.
  - 4. **CONTRACTOR** shall protect geotextile from excessive heat, cold, puncture, cutting, or other damaging or deleterious conditions.
  - 5. **CONTRACTOR** shall ensure personnel responsible for loading, transport, and

unloading are familiar with handling and transport constraints imposed by Manufacturer.

B. Acceptance at Site

1. **ENGINEER** shall perform inventory and surface inspection for defects and damage of all geotextile rolls upon delivery.
2. **CONTRACTOR** shall unroll and inspect any geotextile roll that may be damaged below surface.
3. **CONTRACTOR** shall repair damage resulting from handling and transport of geotextile at no cost. If irreparable, in the opinion of **ENGINEER**, damaged materials shall be replaced at no additional cost.

C. Storage and Protection

1. **PROJECT MANAGER** will provide on-site storage area for geotextile rolls from time of delivery until installation.
2. The storage of the materials is the responsibility of **CONTRACTOR** from the time the materials are off-loaded until the time the completed installation is accepted. **CONTRACTOR** is responsible for preparing the storage location and for the protection of the material from the elements (e.g. ultraviolet light, moisture, temperature, etc.).
3. After **CONTRACTOR** has removed material from storage area, protect geotextile from puncture, dirt, groundwater, moisture, mud, mechanical abrasion, excessive heat, ultraviolet light exposure, and other sources of damage.
4. Geotextile rolls shall be stored in relatively opaque and water tight wrappings.
5. **CONTRACTOR** shall preserve integrity and readability of the geotextile roll labels, and store such that **PROJECT MANAGER** and **ENGINEER** have access to the package slips or roll labels for each roll to verify roll acceptance.

1.06 QUALITY ASSURANCE:

- A. **ENGINEER** shall at all times have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining that the materials and workmanship are in accordance with the Drawings and these Specifications.
- B. Geotextile installation activities shall be carried out under the observation of **ENGINEER**. Testing shall be performed by **ENGINEER** in accordance with Section 01300 - Quality Assurance and Construction Documentation.
- C. Any work found unsatisfactory or any work disturbed by subsequent operations before acceptance is granted shall be corrected by **CONTRACTOR** as directed by **PROJECT MANAGER**.

**PART 2: PRODUCTS****2.01 MATERIALS****A. Non-Woven Needle Punched Geotextile:**

1. Composition
2. Geotextile shall be of polypropylene fibers.
3. Rolls shall be free of holes, contamination, and foreign matter.
4. The geotextile supplied for the project shall meet or exceed the minimum (unless noted otherwise) roll values shown in the table below:

**TABLE 02270-1 MINIMUM ROLL VALUES FOR GEOTEXTILE**

| Property            | ASTM Test Method | Minimum Average Roll Value |
|---------------------|------------------|----------------------------|
| Weight              | D 3776           | 16 oz/ yd <sup>2</sup>     |
| Thickness           | D 1777           | 170 mils                   |
| Puncture            | D 4833           | 200 lbs                    |
| AOS<br>(Sieve Size) | D 4751           | > 50                       |
| U.V. Resistance     | D 4355           | 70%                        |

**PART 3: EXECUTION****3.01 INSTALLATION:****A. Geotextile Deployment**

**CONTRACTOR** shall handle geotextile in a manner to ensure that geotextile is not damaged, and shall comply with the following:

1. No equipment or tools shall damage the geotextile by handling, trafficking, or other means.
2. No personnel working on the geotextile shall smoke, wear damaging shoes or engage in other activities that could damage the geotextile.
3. Cross seams between two (2) panels of geotextile shall be staggered by a minimum distance of five (5) feet on slopes greater than ten (10) percent.



4. All geotextiles shall be weighted with sandbags, or equivalent, during installation to prevent wind damage. Such sandbags shall be installed during deployment and shall remain until replaced with cover material.
5. Geotextile panels shall be deployed in such a manner as to preclude wrinkles and folds. Any wrinkle or fold that may manifest itself into other geosynthetic layers shall be removed.
6. Geotextile shall be cut with a cutter approved by **ENGINEER**, such as scissors. Unshielded razor knives are not acceptable.
7. Take necessary precautions to prevent damage to the underlying subgrade during placement of the geotextile.
8. During placement of geotextiles, care shall be taken not to entrap, in or beneath the geotextile excessive dust or moisture that cause clogging of drains or filters, or hamper subsequent seaming.
9. Following the installation of all geotextile, an examination of the entire surface shall be conducted to detect potentially harmful foreign objects. Any such foreign objects found shall be removed or the panel shall be replaced by the **CONTRACTOR**, at no additional cost.
10. Geotextile panels shall not be deployed over frozen ground, unless approved by **ENGINEER**.

B. Seaming Procedures

1. On slopes steeper than ten (10) percent all seams shall be continuously sewn. In all other applications, sewing is the preferred seaming method although approved overlaps conducted in accordance with Manufacturer's recommendations and approved by **ENGINEER** are acceptable.
2. Seams to be sewn shall be overlapped a minimum of six (6) inches and shall be sewn with a locking stitch. Seams to be thermally bonded shall be overlapped a minimum of twelve (12) inches.
3. The thread used in sewing shall be of polymeric material having chemical resistance, and if the geotextile is to be exposed for more than thirty (30) days, ultraviolet resistance equal to or exceeding that of the geotextile.
4. **CONTRACTOR** shall take measures to prevent soil, or foreign materials from entering or becoming trapped beneath the geotextile both during and following installation.

C. Defects and Repairs

Repair holes or tears in geotextile as follows:

1. Remove any soil or other material that may have penetrated the torn geotextile.
2. Should any tear exceed ten (10) percent of the width of the roll, that section

of the roll shall be removed from the slope and replaced.

3. On slopes steeper than 10:1 (horizontal:vertical), sew into place, in accordance with Article 3.01(B) of this Section, a patch made from same geotextile. Use continuous sewing.
4. On slopes shallower than 10:1 (horizontal:vertical), sew geotextile patch into place using continuous (preferred) or spot seam in place a patch made from same geotextile, with a minimum twenty-four (24) inch overlap in all directions.

### 3.02 CONSTRUCTION QUALITY ASSURANCE:

- A. Construction Quality Assurance shall be the responsibility of **ENGINEER** and consist of:
  1. Review of required documentation.
  2. Approval of geotextile rolls for deployment.
  3. Observation of unrolled material for damage.
  4. Observation of seaming or overlapping procedure and completed seams.
- B. Seams:
  1. Will be observed for required overlap.
  2. Seams that do not have the required overlap will be marked for adjustment.
- D. Exposed seams will be ballasted to provide final protection against wind damage, per approval of **PROJECT MANAGER** and **ENGINEER**.

**\*\* END OF SECTION \***

## SECTION 02710 PIPING

### PART 1: GENERAL

#### 1.01 SUMMARY:

- A. The work includes supply and installation of Corrugated Metal Pipe (CMP) for culverts as shown on the Drawings. These Specifications encompass the furnishing of all labor, materials, transportation, handling, storage, supervision, tools and other equipment that may be necessary to install the piping as described herein and shown on the Drawings. Although such work is not specifically indicated, the **CONTRACTOR** shall furnish and install all supplementary or miscellaneous items, appurtenances, and devices incidental to or necessary for a sound, secure, and complete installation to complete the work as described in the Contract Documents.
- B. Refer to the following Sections for related works:
  - Section 01300 - Quality Assurance and Construction Documentation
  - Section 02200 - Earthworks
  - Section 02270 - Geotextile

#### 1.02 SUBMITTALS:

- A. **CONTRACTOR** shall provide detailed information on proposed pipes and fittings, from pipe Manufacturer in accordance with article 1.03 of this Section, sufficient to allow evaluation and approve by the **ENGINEER** and **PROJECT MANAGER**.
- B. If "or equal" product is proposed, submit samples, technical data, test data, and specifications sufficient to allow evaluation and approved by the **ENGINEER** and **PROJECT MANAGER**.
- C. **CONTRACTOR** shall submit for evaluation and approved by the **ENGINEER** and **PROJECT MANAGER** within twenty-eight (28) days prior to the start of pipe work, complete detailed shop drawings of all pipe and fittings, a list of materials to be furnished, and the name of the pipe Manufacturer. When special fittings are required, verify locations of items and include complete details.

#### 1.03 MEASUREMENT AND PAYMENT

- A. Per unit (lump sum - each crossing) for excavation, CMP, and backfill to the lines and grades shown on the Drawings, unless designated otherwise by Contract Documents.

#### 1.04 QUALITY CONTROL:

- A. **CONTRACTOR** shall submit the pipe Manufacturer's certification of compliance with this Specification to allow evaluation and approval by the **ENGINEER** and **PROJECT MANAGER**.

- B. The **ENGINEER** and **PROJECT MANAGER** shall at all times have access to the work during its construction and shall be furnished with every reasonable request for information to ascertain that the materials and workmanship are in accordance with these Specifications.
- E. Any work found unsatisfactory or any work disturbed by subsequent operations before acceptance is granted shall be corrected by **CONTRACTOR** as directed by **PROJECT MANAGER** and **ENGINEER**.
- F. Galvanized CMP shall comply with AASHTO M-36 and ASTM A760 Standards. Gaskets and sealants shall comply with ASTM D1056 standards.

#### 1.05 TOLERANCES:

- A. Excavation limits are defined by the lines and elevations shown on the Drawings.
- B. Maintain uniform gradients to a tolerance of plus or minus one-half (1/2) percent grade between adjacent spot elevations as shown on the Drawings. The minimum gradient shall not be less than one-half (1/2) percent grade, unless shown otherwise on the Drawings. Excavate in a manner so that piping can be laid straight at a uniform grade and to the minimum grade requirements, without sags or humps.

#### 1.06 TRANSPORTATION:

- A. Transportation of pipe and fittings shall be the responsibility of **CONTRACTOR**. **CONTRACTOR** shall be liable for all damage to the pipe and fittings incurred prior to and during transportation to the site.

#### 1.07 HANDLING AND STORAGE:

- A. Handling, storage and care of the pipe and fittings prior to and following installation at the site, is the responsibility of **CONTRACTOR**. **CONTRACTOR** shall be liable for all damage to the material incurred prior to final acceptance.
- B. **CONTRACTOR** shall be responsible for storage of pipes and fittings at the site. Pipes and fittings shall be stored on clean level ground, preferably on a smooth compacted surface, free of sharp objects which could damage these materials. Stacking shall be limited to a height that shall not cause excessive deformation of the bottom layers of pipe under anticipated temperature conditions. Where necessary, due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitable and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

#### 1.08 QUALITY ASSURANCE:

- A. **ENGINEER** shall at all times have access to the work during its construction and shall be furnished with every reasonable facility for ascertaining that the materials and workmanship are constructed in accordance with the Drawings and these Specifications.

- C. Any work found unsatisfactory or any work disturbed by subsequent operations before acceptance is granted shall be corrected by **CONTRACTOR** as directed by **PROJECT MANAGER** and **ENGINEER**.

#### 1.09 REFERENCES:

ASTM A760 and AASHTO M-36 - Standard Practice for Installing Factory Made Corrugated Metal Pipe

### PART 2: PRODUCTS

#### 2.01 MATERIALS:

- A. Culverts
  - 1. CMP Culverts diameters are as shown on the Drawings.
  - 2. CMP Culvert gauge thicknesses shall be as shown on the Drawings or an equivalent approved by the **ENGINEER**.
  - 3. Galvanized sheet for the manufacture of the CMP shall be produced in accordance with ASTM A444 or AASHTO M-218 with a costing weight of two (2.0) ounces per square foot of sheet (total both sides).
  - 4. CMP Culverts will have corrugations as shown on the Drawings or an equivalent approved by the **ENGINEER**.

### PART 3: EXECUTION

#### 3.01 HANDLING AND PLACEMENT:

- A. Pipe and fittings shall be installed as indicated on the construction Drawings.
- B. The **CONTRACTOR** shall exercise care when transporting, handling and placing pipe and fittings, such that they will not be cut, kinked, twisted, or otherwise damaged.
- C. The **CONTRACTOR** shall comply with the pipe manufacturer's recommendations for handling, storage, and installation of all pipe fittings.
- D. Ropes, fabric, or rubber-protected slings and straps shall be used when handling pipe. Chains, cables or hooks shall not be inserted into the pipe ends as a means of handling pipe.
- E. Pipe or fittings shall not be dropped onto rocky or unprepared ground. Under no

circumstances shall pipe or fittings be dropped into trenches, or dragged over sharp objects.

### 3.02 INSTALLATION:

- A. CMP culverts shall be installed in strict accordance with Manufacturer's recommendations and the following requirements:
  - 1. The completed trench bottom and CMP backfill shall be compacted in accordance with the Select Structural Fill requirements of Section 02200.
  - 2. Except for the first two joints, before making final connections of joints, two (2) full sections of pipe shall have been previously installed with Select Structural Fill tamped along side of pipe.
  - 3. Unless otherwise shown on the Drawings, provide a maximum fill cover of twenty (20) foot on CMP. Provide minimum fill cover over buried CMP as shown on the Drawings.

### 3.03 JOINTS AND CONNECTIONS:

- A. Block, anchor, or harness exposed CMP culvert piping subjected to internal or external pressure, in which mechanical, pushcon, flexible, or similar joints are installed, to prevent separation of joints.

### 3.04 BEDDING AND BACKFILL:

- A. Culvert trench bottoms and CMP backfill shall be compacted in accordance with the Select Structural Fill requirements of Section 02200.
- B. If pipe becomes damaged during or after installation by the **CONTRACTOR's** methods of construction, the pipe shall be replaced by the **CONTRACTOR**, at no additional cost.

### 3.05 SURVEY CONTROL:

- A. The **CONTRACTOR** shall survey the location and elevations of the installed piping in accordance with Section 01300 of these Specifications.

### 3.06 PROTECTION OF WORK:

- A. The **CONTRACTOR** shall use all means necessary to protect all materials, and all partially-complete and completed work.

- B. In the event of damage, the **CONTRACTOR** shall immediately make all repairs and replacements necessary, to the approval of the **ENGINEER** and **PROJECT MANAGER** and at no additional cost.

**\*\* END OF SECTION \***